

WHAT IS CLAIMED IS:

1 1. A light-emitting device comprising:
2 a sapphire substrate; and
3 a light-emitting layer comprising $\text{In}_x\text{Ga}_{1-x}\text{N}$, wherein said
4 light-emitting layer has an indium mole fraction X ranging from
5 about 0.13 to about 0.18 and emits blue light.

1 2. A light-emitting device according to claim 1,
2 further comprising:
3 a buffer layer comprising AlN;
4 a first clad layer comprising n-GaN; and
5 a second clad layer comprising p-GaN doped with
6 magnesium.

1 3. A light-emitting device according to claim 2,
2 further comprising:
3 a transparent electrode comprising gold disposed
4 on said second clad layer; and
5 an electrode pad disposed on said first clad
6 layer.

1 4. A light-emitting device according to claim 2,
2 further comprising:
3 an interposed layer comprising $\text{Al}_x\text{In}_y\text{Ga}_{1-x-y}\text{N}$,
4 wherein said interposed layer has a wide band gap, is doped

5 with an acceptor, and is interposed between said light-emitting
6 layer and said second clad layer.

1 5. A light-emitting device according to claim 4,
2 wherein said acceptor is a group IIA element.

1 6. A light-emitting device according to claim 4,
2 wherein said acceptor is magnesium.

1 7. A light-emitting device comprising:
2 a sapphire substrate; and
3 a light-emitting layer comprising $\text{In}_x\text{Ga}_{1-x}\text{N}$, wherein said
4 light emitting layer has an indium mole fraction X ranging from
5 about 0.19 to about 0.26 and emits green light.

1 8. A light-emitting device according to claim 7,
2 further comprising:
3 a buffer layer comprising AlN;
4 a first clad layer comprising n-GaN; and
5 a second clad layer comprising p-GaN doped with
6 magnesium.

1 9. A light-emitting device according to claim 8,
2 further comprising:
3 a transparent electrode comprising gold disposed

on said second clad layer; and

an electrode pad disposed on said first clad layer.

10. A light-emitting device according to claim 8, further comprising:

an interposed layer comprising $\text{Al}_x\text{In}_y\text{Ga}_{1-x-y}\text{N}$, wherein said interposed layer has a wide band gap, is doped with an acceptor, and is interposed between said light-emitting layer and said second clad layer.

11. A light-emitting device according to claim 10, wherein said acceptor is a group IIA element.

12. A light-emitting device according to claim 10, wherein said acceptor is magnesium.

13. A semiconductor light-emitting device comprising:
a sapphire substrate; and
a light-emitting layer comprising $\text{In}_x\text{Ga}_{1-x}\text{N}$ with an indium mole fraction X and emitting light with a wavelength λ ;

wherein the indium mole fraction X and the wavelength λ of the emitted light approximately satisfy the following conditions:

9 $\lambda \text{ (nm)} = 1239.8/E_g \text{ (eV)}$
10 $E_g = 3.4 * (1-X) + 1.95 * X - 4.26 * X * (1-X).$

1 14. A semiconductor light-emitting device according
2 to claim 13, wherein the indium mole fraction X ranges from
3 about 0.13 to about 0.18, and the light-emitting layer emits
4 blue light.

1 15. A semiconductor light-emitting device according
2 to claim 13, wherein the indium mole fraction X ranges from
3 about 0.19 to about 0.26, and the light-emitting layer emits
4 green light.

1 16. A semiconductor light-emitting device according
2 to claim 13, further comprising:
3 a buffer layer comprising AlN;
4 a first clad layer comprising n-GaN; and
5 a second clad layer comprising p-GaN doped with
6 magnesium.

1 17. A semiconductor light-emitting device according
2 to claim 16, further comprising:
3 a transparent electrode comprising gold disposed
4 on said second clad layer; and
5 an electrode pad disposed on said first clad

6 layer.

1 18. A semiconductor light-emitting device according
2 to claim 16, further comprising:

3 an interposed layer comprising $\text{Al}_x\text{In}_y\text{Ga}_{1-x-y}\text{N}$,
4 wherein said interposed layer has a wide band gap, is doped
5 with an acceptor, and is interposed between said light-emitting
6 layer and said second clad layer.

1 19. A light-emitting device according to claim 18,
2 wherein said acceptor is a group IIA element.

1 20. A light-emitting device according to claim 18,
2 wherein said acceptor is magnesium.

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